



EXECUTIVE WHITEPAPER

**Virtualization Management and
the Dynamic Data Center:**

*Five Ways to Extend the Value
of Your Virtualization Platform*

Looking Beyond Virtual Machines

The inefficiency and high capital costs of conventional application environments—in which each application and operating system is tied to a specific physical resource—is a major problem for businesses. Virtualization platforms such as VMware are providing the solution by decoupling applications and operating systems from the underlying physical hardware. The strategy is enabling enterprises around the world to utilize resources much more efficiently. In fact, IDC recently estimated that more than three quarters of all companies with more than 500 employees are deploying virtual servers.

However, when it comes to the escalating costs of IT, capital expenses are only one part of the equation. According to a 2006 Forrester Research report, staffing expenses actually are the largest IT cost, consuming 38 percent of IT budgets—more than twice the cost of hardware investment and maintenance. Virtualization offers few advantages for controlling operational costs and may even increase them—especially in large organizations with complex data center environments that incorporate hundreds of applications and operating systems. Consolidating hardware platforms in such environments will deliver some capital savings, but organizations still must manage a huge number of virtual machines (VMs), all of which consume the same software, maintenance, and administration costs as a physical server. As Forrester states in its 2006 report *Server Virtualization Goes Mainstream*, “Virtualization... creates a systems management reality that leads to automation of virtual servers. Because it’s so easy to create new servers, firms will soon find themselves with more system images than ever, even as they reduce the hardware count. And it won’t be easy to track or update images that are scattered around as files.”

Even when coupled with solid virtualization management tools, virtualization platforms still provide only a partial solution for managing large data centers. After all, many data center resources that could benefit from dynamic management simply are not appropriate for virtualization. For example, Java 2 Enterprise Edition (J2EE) application servers suffer major performance hits when virtualized, I/O intensive applications, such as transaction monitors, suffer from the added overhead, and multi-CPU applications such as Oracle RAC or SAP are usually not appropriate for virtualization at all. (Instead of putting multiple applications of this type on one machine, Oracle RAC, SAP, and others require scaling out – putting one application across many computers – to handle the load.) In addition, virtualization platforms usually can manage only their own proprietary VMs. As vendors such as Microsoft and XenSource integrate new types of VMs into popular data center applications, IT departments will face the need to employ multiple VM management consoles from multiple vendors. Without the ability to efficiently control and automate all of these virtualization processes, complex business environments may become even more costly and difficult to manage—even as capital expenses decline.

To address these issues, organizations need a strategy that builds on the capabilities of virtualization platforms such as VMware and delivers those capabilities as part of a comprehensive data center solution. They need an environment in which the management of both VMs and physical hosts is automated, and resources are dynamically allocated to applications as needed, according to the service goals and requirements of the organization. The Cassatt Collage automation engine enables enterprises to create this environment, and to employ virtualization as one component of a larger initiative to exercise comprehensive intelligence and control over all corporate applications. Building upon the exceptional portability, flexibility, and manageability of VMware, Cassatt Collage provides a comprehensive solution for managing diverse virtual and physical data center resources.

Extending the Value of VMware and XenEnterprise with Cassatt Collage

A virtualization deployment alone will provide only a partial answer to escalating IT costs – increased capital efficiency. However, when combined with the Cassatt Collage automation engine, VMware (or XenEnterprise) contributes to an intelligent, overarching solution for a broad spectrum of data center needs, especially in the operational efficiency realm. Cassatt Collage delivers five critical capabilities that extend the value of your virtualization investment and transform your virtualization effort from a simple cost-cutting tool to a foundation for comprehensive data center resource management.

- **Service-Level Automation**, which provides real-time, policy-based load management across the entire data center's physical and virtual environments; Server additions or removals
- **Capacity on Demand**, which allows for efficient scaling-in and scaling-out of both physical and virtualized applications as needed;
- **Comprehensive Operations Management**, integrating all data center resources across a heterogeneous environment into a single management console;
- **Increased Availability**, which extends the availability advantages of virtualized resources to all physical, as well as virtual hosts; and
- **Faster VM deployment**, which allows you to reduce implementation costs and more rapidly realize a return on your VMware or XenEnterprise investment.

Capability 1: Service Level Automation

A virtualized platform without automation can create new administrative burdens that mitigate—or even eclipse—the capital savings that drove the deployment in the first place. Cassatt Collage augments virtual platforms with an intelligent automation engine that goes beyond conventional virtualization tools by allowing you to fully automate the allocation and de-allocation of both physical and virtual resources. With Cassatt Collage, you can manage all data center resources across diverse hardware, software, and operating system environments from a single console, using a single set of techniques. Most importantly, you can build your service-level automation strategy around your organization's actual resource requirements and goals—not just around the capabilities of your virtualized platforms.

Instead of virtualizing applications solely based consolidation needs, the Cassatt Collage automation engine first provides policy-based automation tools that allow you create unique service-level agreements (SLAs) for each application. You then assign servers to applications based on priority, load, schedule, disk usage, or virtually any other criteria that matter to your business. (For example, you can build automation policies around maintaining optimal application performance, operating within a specified number of VM licenses, or a combination of factors.) Finally, the automation engine constantly monitors all resources and automatically provisions VMs as needed, with the capability of supporting applications with physical or virtual resources within individual servers or across multiple CPUs, as the situation dictates.

With this unprecedented level of automation, you can reduce complexity in the data center, dramatically improve server utilization, and maintain high quality of service for even the most complex, interconnected applications. The automated, real-time provisioning provided by Cassatt Collage also eliminates the need for capacity planning, as well as the extensive—and expensive—manual effort that otherwise would be required to respond to swings in resource utilization.

Capability 2: Capacity on Demand

Virtual infrastructure like VMware by itself can provide outstanding virtualization capabilities when “scaling-in,” or deploying multiple applications and environments within a single physical server. However, some applications (such as Oracle RAC, SAP, and large databases), are not appropriate to be virtualized, as they actually require more than one machine, or must remain coupled to physical hardware—increasing the complexity and overall administrative costs of the data center.

Cassatt Collage extends the same efficient management advantages that VMware provides for VMs to the administration of other non-virtualized data center resources—and allows you to manage applications that dynamically scale out to multiple servers just as easily as those that scale in. You can use a single image for both physical and virtual hardware configurations, and the solution dynamically responds to compute loads by adding or reducing CPUs in real time, as conditions dictate, based on your pre-defined rules and goals. You can even scale from a single-VM instance to a multiple-VM instance without requiring that idle VMware ESX hosts be available in advance. With these capabilities, Cassatt Collage leverages your VMware implementation as part of a universal solution for controlling all data center resources.

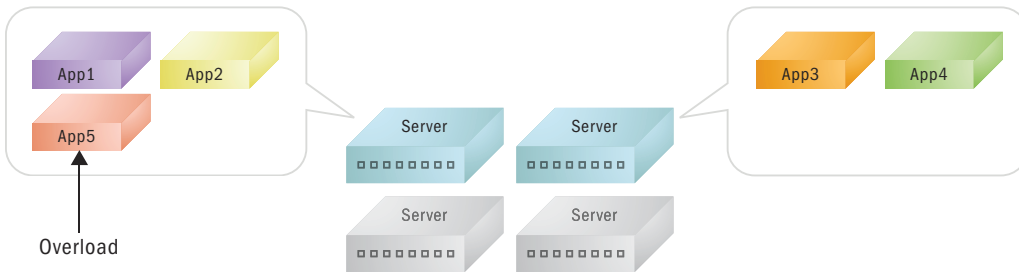


Figure 1: An application becomes overloaded

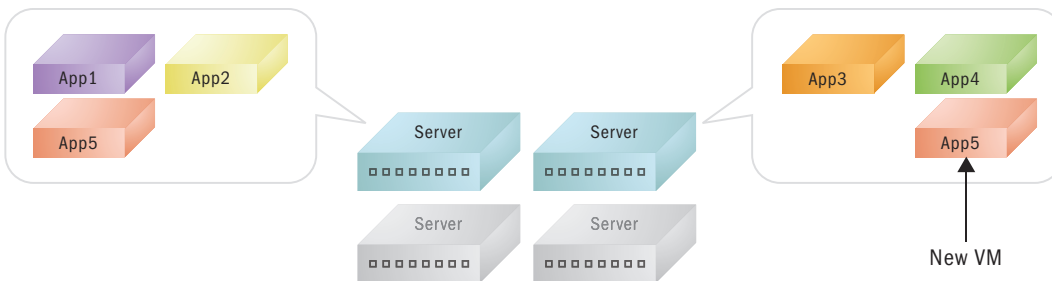


Figure 2: The Cassatt software automatically responds to the overload by creating a new VM

Capability 3: Comprehensive Operations Management

Even when a virtualization platform includes sophisticated tools for managing VMs, those tools still are limited to virtualized applications—and often, only to VMs created within the platform’s preferred environment. Cassatt Collage provides a holistic view of the data center that allows you to control much more than just VM instances. You can view, manage, and automate “mixed” services across heterogeneous VMs, application servers, software environments, operating systems, and hardware platforms from a single management interface.

The Cassatt Collage management console integrates:

- J2EE application server environments (WebLogic, WebSphere) that are not easily controlled by conventional virtualization management software
- Virtual machine monitors (VMMs) from vendors such as VMware and XenSource, for organizations operating or planning to operate a mixed environment ;
- Physical application instances, including hardware, OS and application service, via automated monitoring and provisioning
- The simultaneous service-level status of all 3 environments, above
- The status of unused (free pools) and standby (failover) resources
- A comprehensive record of all manual and automated changes within the controlled environment – for use by configuration management systems, asset management systems, audit systems and cost-accounting systems

Cassatt Collage also supports VMware GSX Server hosts, as well as VMware ESX, allowing you to choose the most cost-effective virtualization method for any given task and maximize your investment in full-featured VMware ESX Server instances. Cassatt Collage also integrates with external data center management and profiling tools such as HP OpenView, allowing for even greater consolidation of management processes and platforms.

Capability 4: Increased Agility

The strategy of consolidating multiple applications onto a smaller number of servers can conserve scarce IT capital, but also presents a new problem: increased vulnerability in the event of a hardware failure.

After all, in an environment in which each application is tied to a specific server, a single hardware failure impacts only a single application. In a virtualized environment with multiple application instances on one machine, a failed server can take several critical services offline at once.

VMware provides important tools for protecting VMs, but once again, can offer these advantages only for virtualized applications. Cassatt Collage complements the failover protection strategies encompassed in VMware providing automated management for the entire data center environment, including both virtualized and physical systems. All resources in the data center have access to a single failover pool. If a failure occurs, the platform brings both VMs and physical hosts back online—either on existing servers or on entirely new hardware—according to your business' pre-defined service-level rules and priorities.

Cassatt Collage also enhances the failover capabilities of VMware by automating the management of a globally accessible pool of free servers—reducing the need to over provision idle VMware ESX hosts to accommodate peak usage. The Cassatt controller constantly monitors the data center for server failures or applications that require additional resources, and, when necessary, dynamically boots a server from the failover pool using a software image with the appropriate operating system, VMM, or both.

In addition to improving server utilization and application resiliency, Cassatt Collage reduces IT operating costs by employing policy-based power management to keep all idle servers powered down whenever they are not in use. These costs can be significant. Some IT executives, such as Neil Rassmussen, chief information officer of APC, estimate that electricity costs account for as much as 20 percent of operating costs for a given data center rack.

By automating management of the global free server pool, Cassatt Collage also makes it easy to bring up new applications without worrying about server provisioning. As applications are added to the data center, IT administrators can easily monitor free server use. If the number of free servers in the failover pool falls too low, they can simply add more servers to the pool to ensure sufficient capacity, even if those servers are idle.

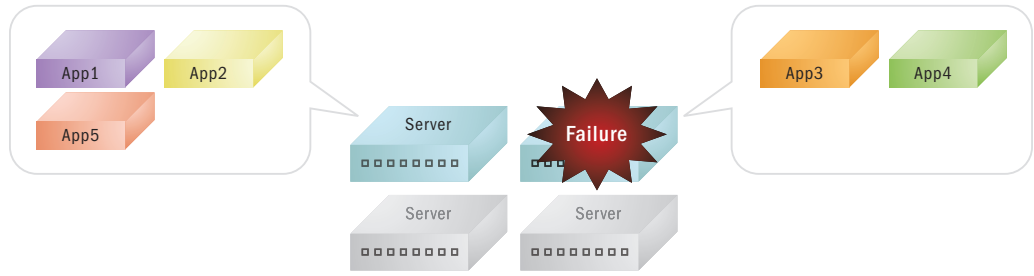


Figure 3: A physical server fails

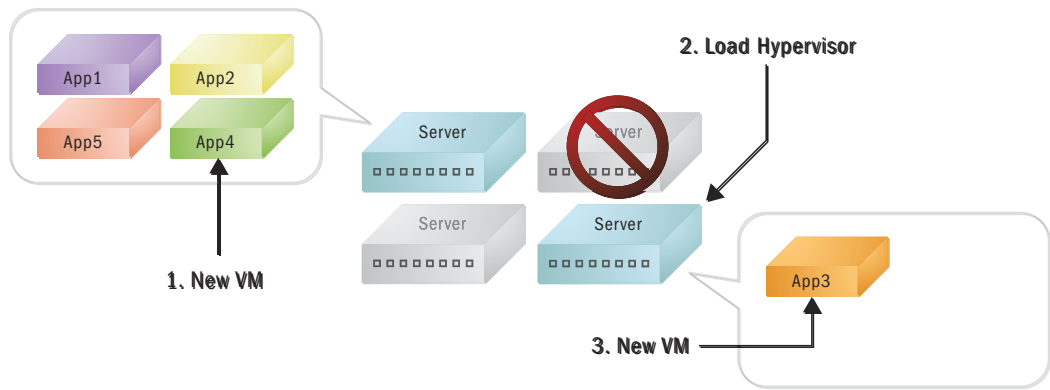


Figure 4: Cassatt automatically responds to the failure by reallocating resources

Capability 5: Faster VM Deployment

A virtualization initiative can deliver substantial capital savings, but usually only after a slow, tedious deployment process. Organizations must perform extensive consolidation planning and testing, and often must manually deploy the solution for each application, operating environment, and server—a process that can stretch out for weeks or even months, depending on the complexity of the environment.

Cassatt Collage allows you to deploy VMs like those from VMware throughout your organization much more rapidly—and realize your virtualization return on investment much more quickly. With Cassatt Collage, you can automate the dynamic provisioning and deployment of VMs, hosts, and application stacks, including VMware ESX. You can take any image and replicate it quickly and dynamically wherever required, as often as necessary, across even the most diverse environments.

Automating repetitive physical-to-virtual and virtual-to-physical tasks also provides much greater flexibility and control over virtualization projects. For example, if application performance or licensing becomes

a factor in a given implementation, you can automate the process of rolling back virtualization just as quickly and easily as automating the initial deployment. Cassatt Collage also increases the speed and efficiency of the virtualization testing process (or any other software testing process) by allowing you to simply copy an image from a test server and deploy it into live production.

Generating Maximum Value from Your VMware or XenEnterprise Investment

These five key capabilities delivered by the Cassatt Collage automation engine can extend the advantages of service automation and resource control far beyond the realm of virtual machines and unlock the full potential of your VMware or XenEnterprise virtualization effort. With Cassatt Collage, all of your data center activities can be prioritized and provisioned intelligently, dynamically, and cost-effectively. Your data center becomes a much more flexible environment that can dynamically respond to both the unpredictable (such as spikes in resource utilization) and the planned (such as a new product rollout or a merger). Ultimately, these capabilities allow you to achieve a new model of strategic resource control and a new level of agility for your business.

Laying the Foundation for the Utility Data Center

Superior virtualization platforms such as VMware and XenEnterprise can provide valuable cost savings and apply critical intelligence to streamline virtualization processes. But these platforms hold the potential to do even more: They also can serve as the foundation for a new operating paradigm for your data center. With Cassatt Collage, your virtualization investment can become a cornerstone for transforming the data center into a true utility, and enabling you to deliver the appropriate resources wherever and whenever they are needed, automatically and transparently.

In this data-center-as-utility model, all resource pools can be managed and provisioned the same way, according to the same set of business goals and policies, regardless of environment, operating system, or type of resource. Applications and users always have the prioritized resources they need, regardless of circumstances. And, exactly the right amount of resources are allocated to each job, at each moment, with no resources wasted.

Best of all, this utility foundation can be established without additional software layers, schedulers, grids or agents. The Collage software resides on its own controller, leveraging the unmodified software, hardware, and networking resources you already own.

This vision is compelling, and it is one that businesses can actually begin implementing today, employing the principles and capabilities of leading virtualization platforms such as VMware and XenEnterprise. However, virtualization platforms can only accommodate this evolution when they are integrated into a comprehensive resource management solution, controlled by the service-level goals and requirements of the business. The Cassatt Collage automation engine provides this framework for comprehensive data center control. Providing service-level automation, dynamic scalability, comprehensive management, increased resiliency, and faster deployment, Cassatt Collage maximizes the value of your virtualization investment today, while providing a building block for even greater efficiencies and capabilities in the future.

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